What is claimed is:

1. An ion pump comprising:

an insulating layer;

a first conductive layer situated on a first side of the insulating layer;

a second conductive layer situated on a second side of the insulating layer;

a plurality of openings situated in the first conductive layer, the insulating layer and the second conductive layer forming channels having first and second discharge device electrodes; and

an enclosure containing the channels and having an input port proximate to an input side of the plurality of openings and an output port proximate to an output side of the plurality of openings.

2. The pump of claim 1, wherein a fluid in the enclosure can be transported between the input port and output port by being forced through the plurality of openings.

3. The pump of claim 2, wherein:

a first portion the plurality of openings situated the first conductive layer are sharp-like conductor openings and a second portion of the openings are non-sharp-like conductor openings, to generate in-situ ions proximate to the sharp-like conductor openings;

the in-situ ions predominantly have the polarity of the sharp-like conductor openings, which then induce a fluid flow of neutral molecules as a result of a force and viscous drag of the in-situ ions and away from the sharp-like conductor openings.

4. The pump of claims 3, wherein:

the plurality of openings is grouped into first and second stages;

the stages are arranged in a flow series; and

a total useful pressure difference of the pump is approximately equal to that of each stage multiplied by a number of stages.

5. The pump of claim 3, wherein:

the openings situated at inputs of the first and second stages are sharp-like conductor openings; and

the openings situated at outputs of the first and second stages are non-sharp-like conductors; and

the first and second stages are in separate chambers.

6. The pump of claim 2, wherein the sharp-like conductor openings comprise conductive nanotube whiskers.

7. The pump of claim 6, wherein the nanotube whiskers are for providing an electrical discharge in a cold cathode field emission mode.

8. The pump of claim 6, wherein the nanotube whiskers are for providing an electrical discharge in a corona discharge mode.

9. The pump of claim 2, wherein the first and second discharge device electrodes energized by a voltage provide an electrical discharge.

10. The pump of claim 2, wherein the sharp-like conductor openings comprise thin-film material.

11. The pump of claim 2, wherein the sharp-like conductor openings comprise conductive electrode material to provide an electrical discharge in a cold cathode field emission mode.

12. The pump of claim 2, wherein the sharp-like conductor openings comprise conductive electrode material to provide an electrical discharge in a corona discharge mode.

13. The pump of claim 2, wherein:

the sharp-like conductor openings comprise 10 to 100 nm-thick films of conductive material; and

the non-shape-like conductor openings comprise:

100 to 10,000 nm thick films of conductive material; and

rounded inner diameter edges.

14. The pump of claim 2, wherein the plurality of openings is fabricated with a technique selected from a group containing etching, laser-drilling, mechanical stamping and a combination of etching, laser-drilling and mechanical stamping.

15. The pump of claim 2, wherein the each opening of the plurality of openings is sized for a ratio, R, of an axial length equal to a thickness of the insulator, to an inner diameter, of each opening to maximize a performance of the pump, having approximately $1 \leq R \leq 10$, and the thickness of the insulator about $6\ \mu m \leq S \leq 100\ \mu m$.

16. The pump of claim 2, further comprising a number of consecutive stages, L, of channels, and having an applied voltage, U, as required to achieve a desired total pressure head, $\Delta p_t = n \cdot \Delta p$, where an achieved pressure head at each stage is about Δp, including compensation for the changes in absolute pressure, gas volume due to compressibility, and temperature at each stage, which entails changes in pump effectiveness and capacity at each stage.

17. The pump of claim 2, wherein a number of openings, n, of the plurality of openings, stages, L, and applied voltage, U, are selected so that a desired total pumping volumetric rate and total pump head pressure can be achieved, including compensation for a pressure drop through the pump, and a required number of openings, n_o,

and compensation for a pressure drop through the analyzer load.

18. The pump of claim 17, wherein:

the number of openings, n, is increased by a factor α

$= n/n_O = \Delta p_O / (\Delta p_O - \Delta p_L)$;

Δp_O = pump pressure head without a load;

Δp_L = pressure drop through the load; and

$\Delta p_O \sim 2 \cdot \Delta p_L$.

19. The pump of claim 2, wherein rapid control of a sample gas flow is enabled upon resetting applied fields of the first and second discharge device electrodes to achieve small gas pulses/injections of sample/analyte into micro-GC columns, as in one of a group containing a second stage of a GC-GC system and a second part of a separation column of a second material.

20. The pump of claim 2, wherein the pump is operated like a valve by adjusting an applied voltage across the first and second discharge device electrodes to oppose and balance an external flow and pressure.

21. Pump means of claim 3, wherein each of the sharp-like conductor openings are recessed to a larger inner diameter than an inner diameter of each of the plurality of openings in the insulating layer, by a distance equal to about 10 to 20 percent of the inner diameter of an opening in the insulating layer, to enable removal of non-predominant polarity ions before remaining predominant ions enter the inside diameters of the plurality of openings in the insulating layer.

22. An ion pump comprising:

a flow channel;

a first conductive material at a first position in the channel; and

a second conductive material proximate at a second position in the flow channel; and

wherein:

the first and second conductive materials form a discharge device;

the first conductive material has a prominent-like contour;

a distance between the first position and the second position is maintained by a non-conducting spacer material; and

a flow direction of the flow channel is approximately parallel to the elongated dimension through the non-conducting spacer material, and proceeding from a prominent conductive material to a non-prominent conductive material, wherein the conductive materials are electrodes forming the discharge device.

23. The pump of claim 22, further comprising a plurality of the flow channels having the first and second conductive materials.

24. The pump of claim 23, wherein:

the flow channels of the plurality of the flow channels form an array in a plane; and

an axis of each flow channel is approximately perpendicular to the plane.

25. An ion pump comprising:

a channel;

a first conductive material at a first position in the channel; and

a second conductive material proximate at a second position in the channel; and

wherein:

the first and second conductive materials form a discharge device;

the first conductive material has a prominent-like contour;

a distance between the first position and the second position is maintained by a non-conducting spacer material; and

a flow direction of the channel is approximately parallel to the elongated dimension through the non-conducting spacer material.

26. The pump of claim 25, further comprising a plurality of the channels having the first and second conductive materials.

27. The pump of claim 26, wherein:

the channels of the plurality of the channels are situated in a plane;

the elongated dimension of each channel is approximately perpendicular to the plane; and

the plane is not necessarily flat.

28. The pump of claim 27, wherein a first portion of the plurality of channels has the first conductive material on a first side of the plane and the second conductive material on a second side of the plane.

29. The pump of claim 28, further comprising an enclosure having an input port and an output port.

30. The pump of claim 29, wherein the first portion of the plurality of the channels is situated in the enclosure with the first side of the plane proximate to the input port and the second side of the plane proximate to the output port.

31. The pump of claim 28, wherein a second portion of the plurality of the channels has the first conductive material on the second side of the plane and the second conductive material on the first side of the plane.

32. The pump of claim 31, wherein a third portion of the plurality of the channels has the first conductive material on the first side of the plane and the second conductive material on the second side of the plane.

33. The pump of claim 32, further comprising:

an enclosure having an input port in the first side of the plane and proximate to the first portion of the plurality of the channels and an output port in the second side of the plane and proximate to the third portion of the plurality of the channels; and

wherein the enclosure provides a path from the input port through the first portion of the plurality of the channels to the second side of the plane, through the second portion of the plurality of the channels to the first side of the plane, and through the third portion of the plurality of the channels to the output port.

34. The pump of claim 33, wherein the first conductive material has at least one nanotube.

35. The pump of claim 33, wherein the first conductive material has at least one cold cathode field emission device.

36. An ion pump comprising:

a plurality of pumping elements; and

wherein each pumping element of the plurality of pumping elements comprises:

a first orifice in a first electrode plate;

a second orifice in a second electrode plate; and

a layer of insulating material situated between the first and second electrode plates and having an opening between the first and second orifices; and

wherein the first orifice has a sharp-like contour to achieve local high intensity electric fields.

37. The pump of claim 36, further comprising a chamber that encloses the plurality of pumping elements.

38. The pump of claim 37, wherein the chamber has an input port and an output port.

39. The pump of claim 38, wherein the chamber has a structure that provides a path from the input port to the plurality of pumping elements through the first orifices, the openings, the second orifices and to the output port.

40. The pump of claim 39, wherein the first and second orifices of each pumping element form a discharge device.

41. The pump of claim 40, wherein the first orifice of each pumping element is capable of producing an ionizing corona.

42. A method for pumping, comprising:

providing at least one set of first and second electrodes separated by a distance;

containing the at least one set of first and second electrodes in an enclosure having an input and an output;

shaping the first electrode so as to be suitable for providing a corona of ionization of a fluid; and

applying a DC voltage to the at least one set of first and second electrodes to result in a corona at the first electrode; and

wherein the corona may generate ions to induce a fluid flow in the enclosure.

43. The method of claim 42, further comprising complementing the at least one set of first and second

electrodes to ignite the discharge with a second set of electrodes to generate an ion drift.

44. The method of claim 43, further comprising applying and using an AC voltage to generate ions in an electroless operation and a DC field to accelerate the ions of the fluid in the direction of a desired flow.

45. The method of claim 44, wherein a negative electrode attracts mostly positive and heavy ions.

46. The method of claim 44, wherein a positive electrode attracts mostly negative ions, generated by an attachment of electrons which is a lower-energy process than a process of removing an electron from a neutral molecule.

47. The method of claim 44, further comprising controlling fluid flow with the at least one set of first and second electrodes to achieve pulses of sample analyte into a gas analyzer and/or out of a gas analyzer.

48. The method of claim 47, wherein the gas analyzer is of gas chromatography.

49. The method of claim 44, further comprising adjusting the voltages to provide valve-like control of the fluid flow.

50. A means for ion pumping, comprising:

means for providing an electrical discharge;

means for enclosing the means for providing an electrical discharge, having an input and an output for a fluid proximate to the electrical discharge; and

wherein the electrical discharge provides a corona of ions to induce a flow of a fluid proximate to the electrical discharge.

51. The means of claim 50, wherein the means for providing an electrical discharge has a nanotube electrode.

52. The means of claim 51, wherein the means for providing an electrical discharge has a cold cathode field emission electrode.

53. An ion pump comprising:

an insulating layer;

a first conductive layer situated on a first side of the insulating layer;

a second conductive layer situated on a second side of the insulating layer;

a plurality of openings situated in the first conductive layer, the insulating layer and the second conductive layer forming channels having first and second discharge device electrodes, respectively; and

an enclosure containing the channels and having an input port proximate to the first conductive layer and an output port proximate to the second conductive layer.

54. The pump of claim 53, wherein the first discharge electrodes have a configuration to generate in-situ ions to induce a fluid flow.